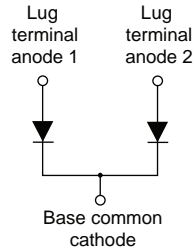


FRED Pt[®], Ultrafast Soft Recovery Diode Module, 400 A


TO-244

FEATURES

- Ultrafast recovery
- Designed for industrial level
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912


**RoHS
COMPLIANT**
BENEFITS

- Reduced RFI and EMI
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

DESCRIPTION / APPLICATIONS

FRED Pt[®] diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are significant portion of the total losses.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	400 A
V_R	600 V
Q_{rr} (typical)	5100 nC
t_{rr}	215 ns
Type	Modules - diode, FRED Pt [®]
Package	TO-244
Circuit configuration	Two diodes common cathode

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current per diode	$I_{F(DC)}$	$T_C = 25\text{ °C}$	572	A
		$T_C = 85\text{ °C}$	397	
		$T_C = 137\text{ °C}$	200	
Single pulse forward current per diode	I_{FSM}	$T_C = 25\text{ °C}$	3330	
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	789	W
		$T_C = 137\text{ °C}$	200	
Operating junction and storage temperatures	T_J, T_{Stg}		-40 to +175	°C

ELECTRICAL SPECIFICATIONS PER LEG ($T_J = 25\text{ °C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage	V_{BR}	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	V_{FM}	$I_F = 200\text{ A}$	-	1.0	1.2	
		$I_F = 400\text{ A}$	-	1.12	1.37	
		$I_F = 200\text{ A}, T_J = 175\text{ °C}$	-	0.83	1.0	
		$I_F = 400\text{ A}, T_J = 175\text{ °C}$	-	0.98	1.21	
Reverse leakage current	I_{RM}	$T_J = 175\text{ °C}, V_R = V_R\text{ rated}$	-	0.3	3.0	mA
Series inductance	L_S	From top of terminal hole to mounting plane	-	5	-	nH



DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 50\text{ A,}$ $di_F/dt = 500\text{ A}/\mu\text{s,}$ $V_R = 200\text{ V}$	-	215	-	ns
		$T_J = 150\text{ }^\circ\text{C}$		-	432	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^\circ\text{C}$		-	48	-	A
		$T_J = 150\text{ }^\circ\text{C}$		-	70	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^\circ\text{C}$		-	5100	-	nC
		$T_J = 150\text{ }^\circ\text{C}$		-	15 100	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	
Thermal resistance, junction to case	per leg	-	-	0.19	$^\circ\text{C}/\text{W}$	
	per module	-	-	0.095		
Thermal resistance, case to heatsink	R_{thCS}	-	0.10	-		
Weight		-	68	-	g	
		-	2.4	-	oz.	
Mounting torque		30 (3.4)	-	40 (4.6)	$\text{lbf} \cdot \text{in}$ ($\text{N} \cdot \text{m}$)	
Mounting torque center hole		12 (1.4)	-	18 (2.1)		
Terminal torque		30 (3.4)	-	40 (4.6)		
Vertical pull		-	-	80	$\text{lbf} \cdot \text{in}$	
2" lever pull		-	-	35		
Case style		TO-244				

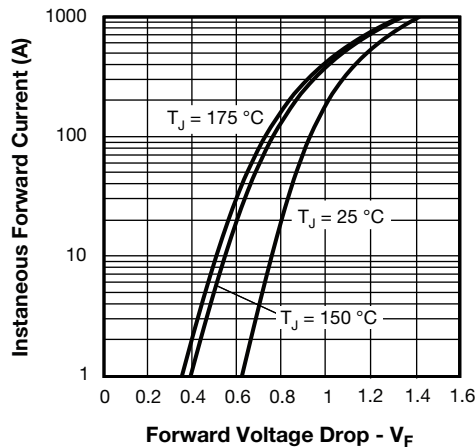


Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

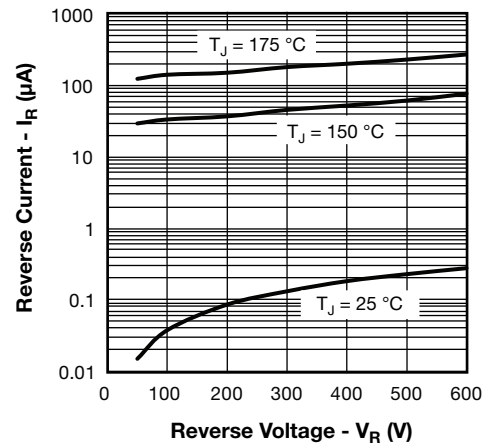


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

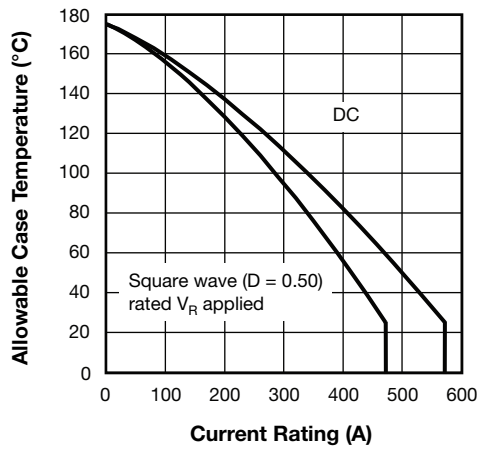


Fig. 3 - Maximum Current Rating Capability (Per Leg)

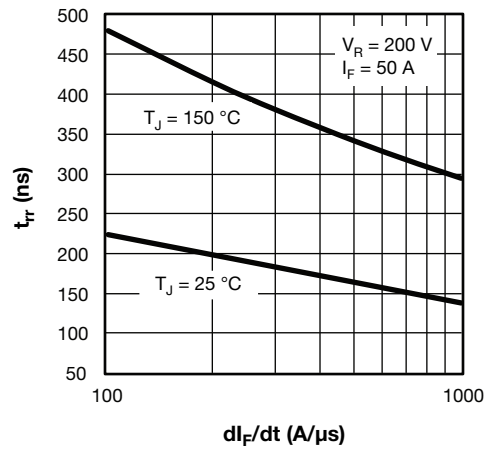


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt

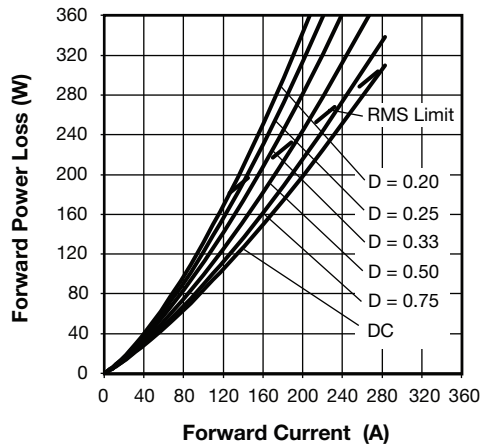


Fig. 4 - Forward Power Loss Characteristics

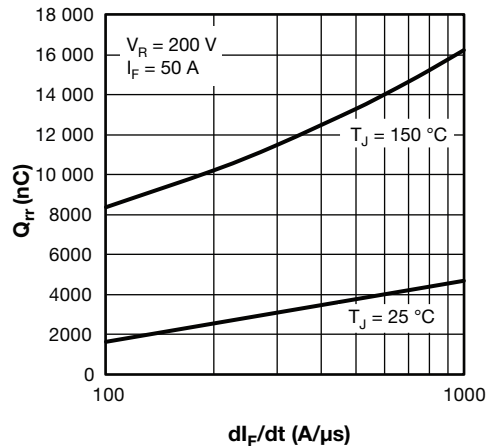


Fig. 6 - Typical Reverse Recovery Charge vs. dI_F/dt

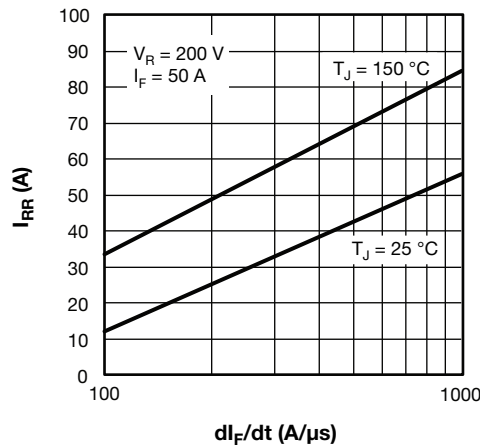


Fig. 7 - Typical Reverse Recovery Current vs. dI_F/dt

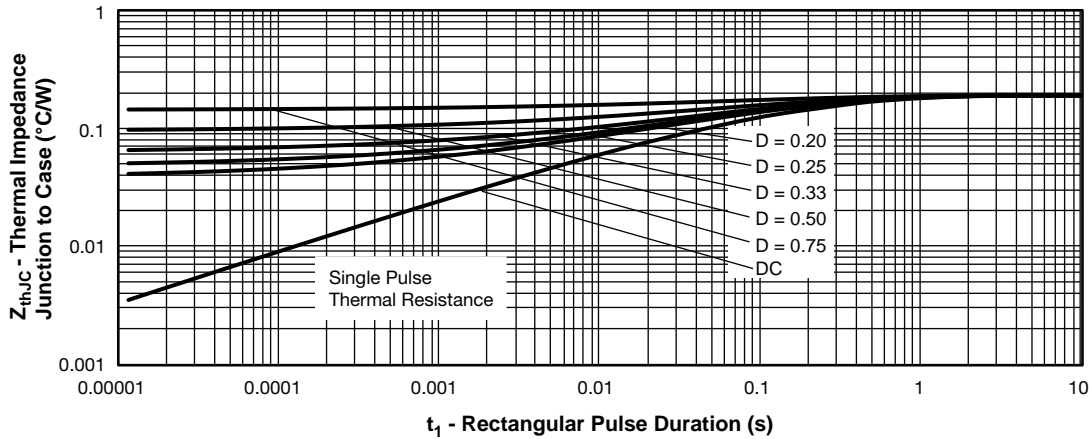


Fig. 8 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

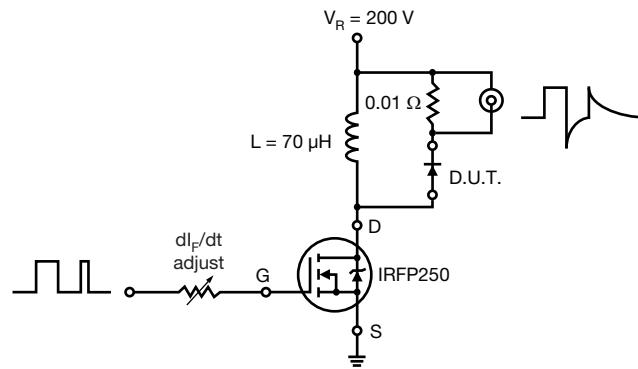


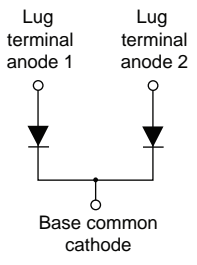
Fig. 9 - Reverse Recovery Parameter Test Circuit

ORDERING INFORMATION TABLE

Device code	VS-VS	UD	410	C	W	60
	①	②	③	④	⑤	⑥

- 1** - Vishay Semiconductors product
- 2** - UD = FRED Pt[®]
- 3** - Current rating (410 = 400 A)
- 4** - Circuit configuration:
C = two diodes common cathode
- 5** - W = TO-244 wire bondable not isolated
- 6** - Voltage rating (60 = 600 V)



CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes common cathode	C	

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95021



TO-244

DIMENSIONS in millimeters (inches)





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